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NOTE ON THE METHOD OF COLONY FOUNDATION OF THE PONERINE ANT *BRACHYPONERA* (*EUPONERA*) *LUTEA* MAYR

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Introduction

The methods of colony foundation among the Ponerinae are of peculiar interest to students of the phylogeny of the Formicidae, for, as emphasized elsewhere, (Wheeler, 1900a, 1900b, 1906, 1932, 1933, Haskins, 1928, 1930, 1941, Haskins and Enzmann, 1938, Haskins and Haskins, 1950a, 1950b) careful study of this most elementary stage of social development in the socially most primitive subfamily of ants may well shed very considerable light on the manner of origin and of subsequent evolution of the social mode of living in the Formicidae. In this connection, it is of particular interest that the observations of Clark (1925, 1934a, 1938), of Wheeler (1932, 1933), and of Haskins and Haskins (1950a, 1950b) on perhaps the two most archaic and socially generalized tribes of the Ponerinae, the Myrmeciini and the Amblyoponini, have indicated that in both of them, despite wide differences in morphology, physiology, and general habitus, the methods of colony foundation are closely similar, and are of a cruder and less specialized character than in any other known ants. In both cases the young female dealates herself, before or after fertilization, secretes herself in a chamber excavated in the soil, and then leaves this chamber at more or less frequent intervals to forage in the open for nourishment to sustain first herself and later her develop-

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ing brood. The brood, when mature, comprises a few workers of the smallest form of the species. The workers and the adult female continue to forage in common until the colony is well developed.

This pattern of colony foundation suggests rather forcefully the nature of social organization of the earliest semi-social ants, which must long since have become extinct, and suggests further that the development of the social habit in the Formicidae, while strikingly similar to that well understood among the social wasps and bees and attested in those groups by the existence today of contemporaneous living intermediate forms, occurred independently in evolution, and probably at a much more remote period of time. It contrasts very strongly with the evidently derived pattern of claustral colony foundation which is common among the higher ants, in which the sexual female and the workers commonly differ greatly in stature, and in which a complicated physiological mechanism has been developed leading to the deterioration of the wing musculature shortly after dealation and, probably, to the conversion of this bulky protein reserve to a suitable form to assist in the sustenance of the queen, and to provide food reserves for the developing brood. These females, which are typical in such well-known genera as *Lasius* and *Camponotus*, after flight and dealation commonly isolate themselves in closed cells, from which they never emerge to forage. Eggs are laid, larvae are reared on a diet consisting entirely of ingluvial food administered by mouth, and at maturity the young workers, and they alone, break open the cell, emerge to forage, and bring back provender to restore the depleted fat-body of the sedentary queen, which never emerges into the open air again, except occasionally very briefly under unusual circumstances connected with a shift of the nesting site.

This specialized method of colony foundation common to so many Myrmicine and Formicine ants presents obvious selectional advantages over the primitive pattern as exemplified in *Myrmecia*. The young founding female, being amply supplied with reserve food material, is far less at the mercy of seasonal and environmental hazards than is the female of *Myrmecia*. The female of *Myrmecia*, forced to forage in the open every day or two for nectar or for living prey, is constantly exposed to dangers from predators from which the female of *Lasius* or *Camponotus* is permanently protected as soon as its first cell is constructed. Finally, even if the young queen of *Myrmecia* succeeds in overcoming the numerous environmental hazards of drought or excessive moisture, of scarcity of food-sources, and of reptilian, avian, and mammalian predators during the difficult days of colony foundation, it is quite likely to become lost or otherwise permanently separated from its nest and its first brood in the course of its extensive wanderings.

Before this advantageous specialization can have taken place in the course of Formicid evolution, however, several concomitant physiological specializations must have occurred in whole or in part, and have been at least partially perfected. One of them is the ability of the individual to regurgitate ingluvial food for the larvae, thus precluding the necessity of supplying the larvae entirely with solid nourishment which must be brought in from outside. This power of regurgitation seems to be wholly lacking in both the Myrmeciini and the Amblyoponini. A second specialization which, while not essential to the development of the claustral method of colony foundation, is exceedingly helpful to it, is the faculty of breakdown of wing-muscle tissue to form a reserve of nutriment for the female. Work is in progress to determine whether there is any indication of such a development in *Myrmecia* or in *Amblyopone*. If present at all, it is certainly not nearly so conspicuous as among the higher ants. Third, it must have been essential, before the claustral method of colony foundation could be fully established, that a considerable difference of size should have been developed between the queen and the worker forms of a given species, so that several of the latter, pupating prematurely, could be sustained from the much greater bulk of the queen, with its specialized reserve of fat-body and perhaps of transformed wing-muscle tissues.

It is clear that none of these specializations occurred suddenly in evolution, and that they must all have been closely interrelated. Concomitantly, it would be expected that the development of the claustral mode of colony foundation would have occurred gradually, as these physiological specializations progressed, manifesting itself as a growing reliance of the queen on the sustaining powers of her own tissues, and an increasing tendency to limit foraging to more and more lengthy intervals, feeding the larvae less and less upon insect prey and more and more upon ingluvial food, until, at last, the habit of foraging disappeared altogether.

The higher tribes among the Ponerinae, especially the Ectatommini, the Odontomachini, and the Ponerini are of peculiar interest in this connection. Here two of the three requisite physiological specializations, at least, seem to be moderately developed in certain species. Considerable discrepancy of stature between the perfect female and the first-brood workers is notable in a number of species of all these tribes. The power of regurgitation, though feebly developed, has been reported for the Brazilian *Odontomachus affinis* by Borgmeier (1920), for *Ectatomma tuberculatum* by Cook (1904–5) and has been observed in *Euponera gilva harnedi* by Haskins (1931). It might be supposed, therefore, that among these higher Ponerinae, examples could be found in which the females, unusually capable of fasting, tended to supply the first-brood larvae at least partially with ingluvial salivary or regurgitated substances and only in part with captured insect food, and to forage much less frequently than the fertile females of *Myrmecia* or *Amblyopone*.

A very definite suggestion of this intermediate situation was obtained in the course of the present study with *Odontomachus haematoda*. A young female, taken immediately after the nuptial flight and dealation, isolated itself in the artificial nest in a closed cell in the typical manner reported by a number of students of this genus. In this case, however, all opportunities to obtain nourishment outside the nest were withdrawn, so that the young queen was thrown entirely on its own resources. Under these conditions, this *Odontomachus* female produced numerous eggs, hatched them, and evidently fed the resulting larvae with ingluvial food (although the process was difficult to observe) since they developed rapidly. They remained healthy for some time but, when somewhat less than one-half mature, declined slowly and eventually perished. Shortly after this, the female perished also. It had been captured on December 9, 1947, and died on March 3, 1948. Thus, although it had been unable to bring its young larvae to maturity or to establish a permanent formicary without outside nourishment, it had raised a good-sized brood through almost half the period of growth on nourishment supplied by its own body and had itself survived for ninety days without food. This represented a much closer approach to the claustral condition than could be achieved among the lower Ponerinae, and it was clear that the question of the intermediate evolutionary stages in colony formation exhibited among the higher Ponerinae merited further investigation.

Perhaps the most interesting of all Ponerine ants for studies of this kind is the Australian species *Brachyponera lutea*, because of the great disparity of size and differentiation of bodily structure between the perfect females and workers, in which it is unique among the Ponerines but approaches rather closely the condition among higher ants. It might be expected that in this species, above others, a close approach to the claustral mode of colony foundation might be achieved. Accordingly, observations were undertaken in the field and in the artificial nest which are recorded herewith.

Brachyponera lutea

The genus *Brachyponera* was considered by Emery (*Genera Insectorum*) as a subgenus of *Euponera*, and exhibits close affinities with that group, and with the genus *Ponera s. str.* in many respects of structure and behavior. As in *Euponera*, it is composed of active ants of wide distribution, showing a remarkable degree of variability and of plasticity of habit for a Ponerine group. In the majority of forms of *Brachyponera*, as in *Euponera*, the stature of the perfect females and of the workers is rather similar. In two species, however, *B. sennaarensis* Mayr of tropical Africa and *B. lutea* Mayr of Australia, the workers are very much smaller than either sexual form. In *B. lutea* this differentiation reaches an extreme both qualitatively and quantitatively, the workers averaging but 4–5 mm. in length and being of a pale yellow to brownish coloration, while the queens attain dimensions of 10–11.5 mm., are of brownish black pigmentation, and carry so much fat-body that their form is very different from that of the workers as, indeed, from the typical form of *Ponera* or *Euponera*.

The species was first described by Mayr (1868, 1876). The extraordinary difference in stature and appearance between queens and workers caused Crawley (1918) to call the cospecificity of the described types into question. The cospecificity has, however, been thoroughly established by studies of Clark, Wheeler, and many others.

Brachyponera lutea is nearly ubiquitous in Australia, extending from the tropics almost into the coldest areas of the continent, and from the very moist soils of the extreme southwest into comparatively dry dune or rocky regions far from the coast. In some areas it is very common. It forms rambling meshes of galleries interwoven in a complex fashion, and probably often extending well underground. These galleries are excavated by preference underneath flat stones or fallen logs, but may occasionally show open craters. The colonies are unusually populous for a Ponerine, and fully developed communities may well comprise over two thousand individuals. There seems to be good evidence that the species feeds extensively on termites, and probably also on the larvae of other ants. Frequently, but not always, it nests close to or within the mounds of various species of termites, or near other ants, not excluding *Myrmecia*. It is very probable that it commonly behaves as a facultative, primitive thief ant.

The habits of *B. lutea* have been described by Clark (1925, 1938) and particularly by Wheeler (1933) who studied the method of colony foundation in the field. During November and December of 1914 and 1931 numerous recently fecundated females were taken by Wheeler in many localities in Australia including Queensland, New South Wales, and southwestern West Australia. All of them were isolated in cells under stones and logs, and in all cases these cells, unlike those typical of *Myrmecia* females, were located so far from the edges of the overlying cover that, in Wheeler's view, it would have been difficult for the occupants to excavate galleries to the outside permitting them to emerge periodically to forage, after the manner of *Myrmecia* and *Amblyopone*. From this evidence, together with the great relative stature and the voluminous fat-body of the queen, Wheeler concluded that colony foundation occurred in the claustral fashion typical of higher ants. Since none of the females observed by him in the field had produced eggs by the end of December, however, he was unable to confirm this conjecture. In the present study, it has been possible to observe the process of colony foundation in *Brachyponera lutea* in the artificial nest from its inception until the maturation of the first brood of workers.

On January 15, 16, and 17, 1948, three isolated fertile females of *Brachyponera lutea* were taken in closed cells excavated in nearly pure sand under stones in a typical Hawkesbury sandstone area near Sydney, N. S. W. These chambers were essentially as described by Wheeler, but one of the three queens had two small worker cocoons, evidently recently spun, and a second had several nearly grown larvae in the chamber. The third was without brood. The existing brood of the two females was destroyed in order to stimulate a recapitulation of the founding process, and all three insects were isolated in artificial nests. Here they soon excavated typical closed cells, which they showed no tendency to reopen. One of the three females was lost. The other two shortly produced further eggs, which were formed into packets and carefully tended.

Drops of a dilute solution of honey were proffered to these females from time to time, and were greedily accepted when thrust within the brood-chamber, but the females did not emerge to hunt for them. No solid food was made available. As the eggs hatched, the young were fed entirely by regurgitation, and developed rapidly. At maturity, the larvae were banked with earth in the usual fashion, the cocoons were spun, were cleaned by the female, and continued to be attentively cared for. By March 15, one of the females had brought to maturity three exceedingly small cocoons and had several young larvae, while several nearly mature (though still small) larvae were present in the other cell. By the end of the month the first cocoon was hatched, the extremely small and very callow young worker being much assisted by the female in eclosion. A second cocoon was successfully hatched by the female on April 11. The young workers remained for some time in the parent chamber, which was still tightly closed, before essaying to forage for food. No assistance was given by the queen in this process, just as the queens had shown no tendency to emerge to forage during the period of growth of the young.

These observations would seem to indicate fairly conclusively the correctness of the conjectures of Wheeler, first, that feeding by ingluvial regurgitated food is the commonest if not the only method by which the young queen of *B. lutea* nourishes the first-brood workers, in contrast to the lower Ponerines, and second, that the colony may be formed in a perfectly claustral manner in this Ponerine, as among the higher ants.

There is some indication, however, that although such perfectly claustral colony foundation can and perhaps usually does occur in *B. lutea*, the pattern may not be as firmly established as among the Formicinae or the Myrmicinae. Thus five mature but virgin females, taken from adult nests near Sydney, when artificially dealated in Lubbock nests, behaved somewhat more typically of the lower Ponerines. All of them formed cells of the usual type, and all shortly produced eggs which were kept in compact packets and carefully tended. The cells, however, were not completely closed in this series. They were, in fact, frequently opened to permit the queens to emerge and forage. These queens, in sharp contrast to those described above, excavated extensive galleries, and, although they spent considerable periods quiescent within the brood-chambers, they also spent much time foraging, and eagerly accepted both nectar and insects, taking workers of *Reticulitermes flavipes* with especial avidity. At times, the females left the nests altogether to wander for periods in the open air before returning to the galleries and eventually to the brood chambers. Although these queens persisted until June, the infertile eggs failed to hatch, and no colonies were established. This was very probably abnormal behavior, based on the infertility of the females. It is of some interest, however, since the pattern so closely approximated that of the normal pattern of the fertile females of other Ponerine species.

It may be concluded, then, that the fertile females of *Brachyponera lutea* are capable of founding their colonies in the typically claustral fashion of higher ants, isolating themselves in permanently closed cells and bringing a few very small workers to maturity on ingluvial food probably derived entirely from their own tissues. At the same time, this remarkably advanced behavior-pattern may be more labile than among the higher ants. It is evident that the females of *B. lutea* retain the capacity to actively forage under certain conditions, and, it is quite likely, may do so normally if an unusually rich supply of insect food is present, as it might be, for example, in a termite mound. This matter remains to be confirmed.

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A NEW GENUS OF FLEA-BEETLES FROM THE WEST INDIES*

By Doris H. Blake
Arlington, Va.

In 1868 Suffrian[1] described two species of small flea-beetles from Cuba which he placed under his section "h" of *Haltica* with a suggestion that the legs were similar to those in the genus *Aphthona* of Chevrolat (which, incidentally, is not true). In the DeJean Catalogue[2] are listed under *Podagrica* three names for one species from Santo Domingo, all nomina nuda, some of which names I have seen on old labels on specimens of this group in the Bowditch collection. In both cases the genus to which these beetles were more or less tentatively assigned was doubtless a matter of convenience, since they do not bear more than a superficial resemblance to the other species in either genus.

In addition to the two species carefully described by Suffrian from Cuba, and the ones named in the DeJean Catalogue from Santo Domingo, there exists an untold number of species of this group scattered on the various islands of the West Indies. Since they are all similarly colored, being yellowish or reddish with violaceous or blue-green elytra, and are minute beetles from 2–4 mm. long, up to the present they have been divided simply into two species—a bigger one (*compressa*) and a smaller one (*auripennis*) as described by Suffrian. Possibly it would be simpler to leave them as such, in the light of what dissection reveals.

As might be expected, there are certain resemblances to be found in the aedeagi of some of these beetles. A similar but somewhat different sort of aedeagus appears in some beetles on each island. Sometimes there are several very similar ones on the same island. This sort of similarity occurs in three groups composed of three or four species each. Besides these, there are

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[1] Suffrian, Archiv für Naturgesch., vol. 34, 1868, p. 211.

[2] DeJean Catalogue, 1837, p. 418.

a number of other beetles with aedeagi that are widely unlike any other and that cannot be grouped with the rest or with each other. When I consider the relatively small number of specimens I have before me and the possibilities in the way of those that may be collected later in the West Indies, I realize how small a contribution to the genus I am able to give in my analysis of the few species (17) that I have studied. No one can distinguish these beetles from mere outward examination. Furthermore, it is not possible at present to identify Suffrian's two species with any degree of certainty. Even if the types are still in existence in the Museum at Halle, there is no certainty that any males are in the lot. Since the Gundlach collection of insects in Cuba, which contains specimens identified by Suffrian, is kept strictly under glass, little can be learned from it.

Maulik writes of *Aphthona*, "the genus being artificial is very difficult to define." Possibly he means that so many diverse species from all over the world are included under *Aphthona* that of necessity the group is far from homogeneous. It is true that the American species pigeon-holed with *Aphthona* do not altogether fit into the description of the European or Asiatic ones. For one thing, the elytra in many are striately punctate instead of confusedly punctate. Crotch described *insolita* Melsh., which is now referred to *Aphthona*, under the genus *Cerataltica*, as subquadrate in shape and striate-punctate. On the other hand, some of the species of *Aphthona* that Jacoby described from Central America seem closer to Jacoby's genus *Palaeothona*, which he described as "rather depressed, elongate and posteriorly widened," and with longer antennae and more transverse thorax. All these species need more study in order to determine their proper relationships. The West Indian group is unlike any of those that I have examined from the North American continent. In shape the beetles are generally broader and more convex than in *Palaeothona* and not at all subquadrate nor with striately punctate elytra as in the species related to *insolita Melsh*. The hind tibia, contrary to Suffrian's statement, is not like that in the European species of *Aphthona*, being rounded, not flat, and having a spur at the tip in the middle, not on the outside, and the claws are appendiculate, not simple. Since this group appears to be a sizable as well as homogeneous one and confined to the West Indies, I am proposing for it the generic name *Homoschema*, from ὁμός *the same*, and σχῆμα (το) *outward appearance*. The type of the genus is *H. ornatum*.

Description of the Genus

From 2–4 mm. in length, oblong oval, widened posteriorly in female, moderately convex, often impunctate and at most very finely and confusedly punctate, lustrous reddish or yellowish with violaceous or blue-green elytra.

Antennae longer than half the body, always pale, rather stout; first joint long, 2nd short, both swollen, 3rd longer than 2nd, 4th longer than 3rd, the rest more or less subequal, gradually shortening a little. Head with distinctly marked frontal tubercles and an impressed line of punctures running up to the large fovea near the upper part of eye, a few scattered punctures usually in the space between eye and antennal sockets. Space between antennal sockets variable, in some narrower species a slightly elevated line gradually vanishing in the lower front, in other wider species, a broad, more convex carina that spreads out down the lower front with a depression on either side below the antennal sockets, this interantennal area very useful in identification as to the group but not to the species of the genus. Thorax considerably wider than long but never twice as wide, with curved and margined sides, and oblique angles anteriorly and almost straight basal margin; moderately convex without depressions, except in one species; surface usually mirror-smooth, sometimes very finely punctate. Scutellum large, triangular, and usually but not in all species, palely conspicuous in the dark violaceous elytra. The elytra often mirror-smooth or very finely and confusedly punctate, wider than the prothorax, convex, with a transverse depression below the humeri, the female usually slightly wider posteriorly. Beneath, the epipleura wide but disappearing at the apical angle. Body beneath usually pale, in a few species the breast and abdomen, and, in these cases, the scutellum too, dark. Legs and antennae always pale. Anterior coxal cavities open. Legs rather short and stout with the hind femora well developed. Tibiae not channelled or flat but rounded and with a short spur in the middle at the end of the hind tibiae. In the male the first joint of anterior tarsi enlarged and also in one species the first joint of the hind tarsi. In all, the first tarsal joint of the hind legs moderately long, in one species about equal to the following joints together. Claws appendiculate.

Key to the Species of *Homoschema*

1. Prothorax with a slight depression on either side near base; elytra deep violaceous with a pale yellowish tip. Haiti . . . . *H. leucurum* n. sp.
   Prothorax not at all depressed on either side near base; elytra dark without pale yellowish tip 2
2. First tarsal joint of hind legs in male swollen, aedeagus long with a flat, roundish tip. Puerto Rico
   H. latitarsum n. sp.
   First tarsal joint of hind legs in male not swollen 3
3. Scutellum usually, and breast and abdomen always, dark 4
   Scutellum, breast and abdomen pale 6
4. Aedeagus with a long attenuated tip. Haiti
   H. hoffmani n. sp.
   Aedeagus with a broad point at tip 5
5. Aedeagus widened to approximately twice the width of tip behind the tip. Puerto Rico, St. Thomas, St. Croix . . . . *H. nigriventre* n. sp.
   Aedeagus widened less than twice the width of tip behind the apex. Puerto Rico . . . . *H. fraternum* n. sp.
6. Beetles larger (3–4 mm.) and broadly convex; aedeagus broad with a short, acute tip 7
   Beetles not so large, aedeagus not so broad and not with a short acute tip 9
7. Aedeagus in dorsal view widened in a smooth curve behind the tip. Cuba . . . . *H. latum* n. sp.
   Aedeagus in dorsal view widened in a sinuous curve behind the tip 8

8. Aedeagi differing slightly in specimens from each island: Puerto Rico. See illustration . . . . . *H. obesum* n. sp.
St. Croix. See illustration . . . . *H. pingue* n. sp.
Haiti. See illustration . . . . *H. opimum* n. sp.
9. Aedeagus with a more or less acute tip, not broadly rounded 10
Aedeagus not at all acute at tip but more or less rounded 13
10. Aedeagus widened shortly behind apex to nearly twice width of apex 11
Aedeagus more gradually widened behind apex 12
11. Aedeagus with complicated structure on dorsal side at tip, not readily described (see illustration). Cat Is. Bahamas . . . . *H. felis* n. sp.
Aedeagus with complicated structure on dorsal side at tip, see illustration. Cuba . . . . *H. ornatum* n. sp.
12. Beetle broadly convex. St. Francisco Mts., Dominican Republic . . . . *H. buscki* n. sp.
Beetle more slender, not very convex. Jamaica *H. jamaicense* n. sp.
13. Aedeagus tapering to apex 14
Aedeagus narrowed before broad apex 15
14. Median orificial plate curving slightly upward without any transverse carina. Guantanamo, Oriente Prov., Cuba . . . . *H. orientense* n. sp.
Median orificial plate apically strongly recurved and elevated. Coast below Pico Turquino, Oriente Prov., Cuba . . . . *H. darlingtoni* n. sp.
15. Aedeagus shorter, broader, the subangular apex very obtuse with straight sides. Felton, Oriente Prov., Cuba . . . . *H. manni* n. sp.
Aedeagus narrower, apex rounded. Andros Is., Bahamas . . . . *H. androsense* n. sp.

Since all the species resemble each other closely in external appearance, and since the generic description is already given, only a short description with the few slight differences to be observed in each species is necessary.

Homoschema hoffmani n. sp.

Fig. 10

From 2.5–3.2 mm. in length, 1.5–1.8 mm. in width, moderately convex, thorax and elytra smooth with fine punctation seen only under high magnification; antennae, head, thorax and legs reddish yellow, breast and abdomen dark, scutellum often dark, elytra violaceous. Area between antennal sockets moderately broad and convex, and extending down the short lower front, with a depression on either side below the antennal sockets.

Type.—Male, and 2 paratypes, U. S. N. M. Cat. No. 59192.

Type locality.—Bizoton, Haiti, Nov., 1925, collected on *Stigmatophyllum lingulatum*, by W. A. Hoffman.

Other localities.—Camp Perrin, W. A. Hoffman, 1925; Mt. Trou d'Eau, Nov., 1934, P. J. Darlington; Manneville, Nov. 16–17, 1934, P. J. Darlington; Cape Haitien, W. M. Mann; Port au Prince, all Haiti.

Remarks.—The distinguishing characters of this species are the dark coloring of the undersurface and the exceedingly long narrow point at the tip of the aedeagus, the latter unlike any other known in the genus.

Homoschema leucurum n. sp.

Fig. 12

From 2.7–3 mm. in length, 1.4–1.7 mm. in width, prothorax with a slight depression on either side at base; very faintly and finely punctate, reddish yellow with deep violaceous elytra having a pale apex. Head with a short elevated area between antennal sockets, lower front flattish.

Type.—Male, and 5 paratypes, U. S. N. M. Cat. No. 59193: 1 paratype in Museum of Comparative Zoology, Type No. 28238.

Type locality.—La Vanneau, Haiti, June, 1925, collected by W. A. Hoffman, on *Bunchosia glandulosa.*

Remarks.—This is the only one of the genus with a pale tip on the elytra. Another unusual feature is a slight depression on either side at the base of the prothorax.

Homoschema latitarsum n. sp.

Fig. 15

From 3–3.5 mm. in length, 2.5 mm. in width, broad, convex, very lustrous, not visibly punctate, reddish yellow with deep violaceous elytra, sometimes deep bronzy purple. Head with a narrow interantennal elevation extending from between antennal sockets halfway down to labrum. First tarsal joint of hind leg in the male broadened as is usually the case in the first tarsal joints of the anterior legs.

Type.—Male, and 1 paratype, Museum of Comparative Zoology Type No. 28237.

Type locality.—Maricao Forest, 2000–3000 ft. alt., Puerto Rico, collected May 31–June 2, 1938, by P. J. Darlington.

Other localities.—Yauco, June, 1934, by C. M. Matos, (Stuart T. Danforth coll.); Adjuntas, July, 1933 and June, 1934, by R. G. Oakley, both Puerto Rico.

Remarks.—The unusual feature about this species is the enlarged first tarsal joint of the hind leg in the male. The long aedeagus with the flat, rounded tip is also unlike any other in the genus.

Homoschema ornatum n. sp.

Fig. 1

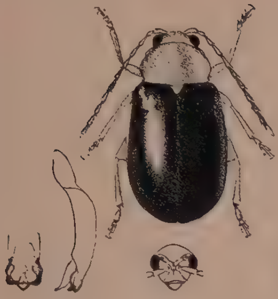
From 2–3 mm. in length, 1.2–1.5 mm. in width, not very convex, finely punctate, reddish or yellowish with deep violaceous elytra. Head with a narrow elevation between antennal sockets and a short line from it down lower front. Lower front unusually long and flattish.

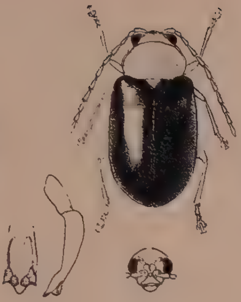
Type.—Male, and 5 paratypes, U. S. N. M. Cat. No. 59194, 2 paratypes in Museum of Comparative Zoology, Type No. 28242.

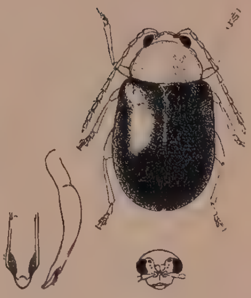
Type locality.—Cayamas, Cuba, collected by E. A. Schwarz in February and March, also by C. F. Baker and George Dimmock in April.

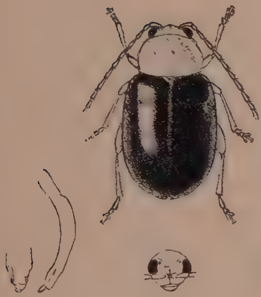
EXPLANATION OF PLATE 1

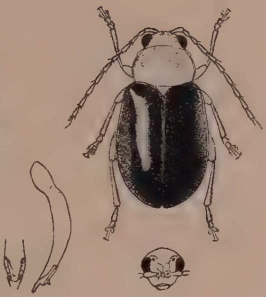
Fig. 1. *Homoschema ornatum* n. sp. Fig. 2. *Homoschema felis* n. sp. Fig. 3. *Homoschema nigriventre* n. sp. Fig. 4. *Homoschema fraternum* n. sp. Fig. 5. *Homoschema jamaicense* n. sp. Fig. 6. *Homoschema androsense* n. sp. Fig. 7. *Homoschema darlingtoni* n. sp. Fig. 8. *Homoschema manni* n. sp. Fig. 9. *Homoschema orientense* n. sp.

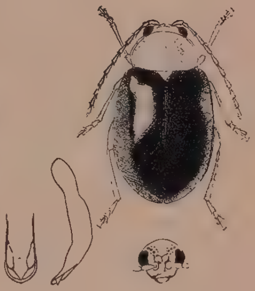

1 Homoschema ornatum

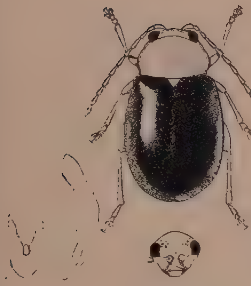

2. H. felis

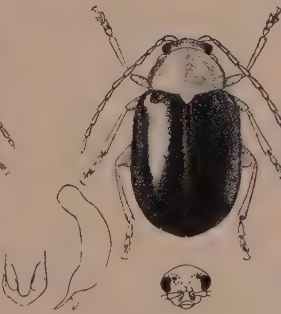

3. H. nigriventre

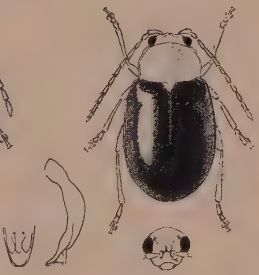

4. H. fraternum


5. H. jamaicense


6. H. androsense


7. H. darlingtoni


8. H. manni


9. H. orientense

BLAKE—FLEA BEETLES

Remarks.—The relatively flat and distinctly punctate upper surface and the narrow aedeagus with a complex structure at the tip in the way of orificial plate distinguish this species. It belongs to a group that is represented in several other islands of the West Indies.

Homoschema felis n. sp.

Fig. 2

About 2.5 mm. in length, 1.2 mm. in width, not very convex, finely punctate, reddish yellow with green elytra; head with a short, narrow elevation between antennal sockets and a line from it down lower front, lower front flat.

Type.—Male, Museum of Comparative Zoology Type No. 28243.

Type locality.—Arthurs Town, Cat Island, Bahamas, collected July 10, 1935, by W. J. Clench.

Remarks.—This species is very closely related to *H. ornatum*, showing only a slight difference in the orificial plate of the aedeagus.

Homoschema nigriventre n. sp.

Fig. 3

From 2.5–3 mm. in length, 1.5 mm. in width, moderately convex, finely punctate, reddish yellow with violaceous elytra and dark breast and abdomen. Head with a slight narrow elevation between antennal sockets and a line proceeding from this down lower front, lower front flattish.

Type.—Male, and 5 paratypes, U. S. N. M. Cat. No. 59195.

Type locality.—Ponce, Puerto Rico, collected Aug. 11, 1933, by R. G. Oakley.

Other localities. — Algarrobo, Feb., 1931, San German, Oct. 11, 1937, Mayaguez, Sept., 1930, all in the Stuart T. Danforth collection; Parguera, Sept., 1933, on *Colubrina;* La Sardinera, June, 1939, W. A. Hoffman; Mona Island, April, 1940, on young shoot of *Clusia rosea*, L. F. Martorell; Rio Piedras, April, 1912, D. L. Van Dine; Manati, Feb., 1933, on leaf of *Crotalaria:* all Puerto Rico.

Remarks.—The dark breast and abdomen as well as its greater convexity separate this species from its close relatives, *H. ornatum* and *H. felis*. The head is not so long either. It has a similarly shaped aedeagus but with a less complex orificial plate. I am unable to separate a series of specimens taken on St. Croix by H. A. Beatty and another series taken on St. Thomas, V. I. collected in January, 1937, in the Stuart T. Danforth collection, from this Puerto Rico species.

Homoschema fraternum n. sp.

Fig. 4

About 2.5 mm. in length, 1.3 mm. in width, not very convex, finely punctate, reddish yellow with violaceous elytra and dark breast and abdomen. Head with a slight narrow elevation between antennal sockets and a line running down the lower front, lower front flat.

Type.—Male, U. S. N. M. Cat. No. 59196.

Type locality.—San Juan, Puerto Rico, collected Oct. 13, 1932, by R. G. Oakley.

Remarks.—This single specimen differs from the others from Puerto Rico in having a narrower aedeagus with considerably less widening behind the tip. It belongs to the same group as *H. ornatum* and *H. nigriventre*, and like the latter is dark below.

Homoschema jamaicense n. sp.

Fig. 5

From 2.4–3 mm. in length, 1.5 mm. in width, not very convex, elytra very finely punctate, yellow or reddish with violaceous elytra; head with a very narrow and short elevation between antennal sockets, and a line extending down in the lower front. Lower front flattish.

Type.—Male, and 7 paratypes, U. S. N. M. Cat. No. 59197; 1 paratype in Museum of Comparative Zoology, Type No. 28236.

Type locality.—Bath, parish of St. Thomas, Jamaica, collected Feb. 8, 1937, by E. A. Chapin and R. E. Blackwelder.

Other localities.—Kingston, Balaclava, Jamaica, Feb. 13, collected by E. A. Chapin and R. E. Blackwelder.

Remarks.—This is the only Jamaican species thus far collected, and is a small, rather flat species with an aedeagus that is suggestive of that of *H. nigriventre*. It probably belongs to that group of species.

Homoschema buscki n. sp.

Fig. 11

From 2.5–3.2 mm. in length, 1.7–2 mm. in width, convex, elytra very finely punctate; yellowish or reddish with violaceous elytra; interantennal area narrowly elevated and extending down a little in lower front, lower front flattish.

Type.—Male, and 6 paratypes, U. S. N. M. Cat. No. 59198.

Type locality.—S. Francisco Mts., Dominican Republic, collected Sept. 4–14, 1905, by August Busck.

Other localities.—Blanton mine, north of San Cristobal, Dominican Republic, July 26, 1917, Harold Morrison, collector.

Remarks.—The convex elytra and the long, gradually acuminate aedeagus unlike any other in this group, distinguish this species. It is not closely related to the group that follows, which is also composed of large convex species.

Homoschema latum n. sp.

Fig. 16

About 3 mm. in length, 1.6 mm. in width, convex, elytra very faintly and finely punctate, reddish or yellowish with violaceous elytra. Head with interantennal area convex and extending down in lower front, a depression on either side below antennal sockets.

Type.—Male, U. S. N. M. Cat. No. 59199.

Type locality.—Upper Yara Valley, Cuba, collected Oct. 18, 1928, on weeds and grasses by L. C. Scaramuzza.

Remarks.—The broad, convex elytra and the short, wide aedeagus distinguish this species. It is closely related to the three following species from Haiti, Puerto Rico and St. Croix,

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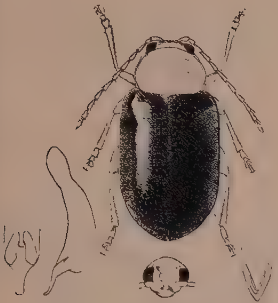
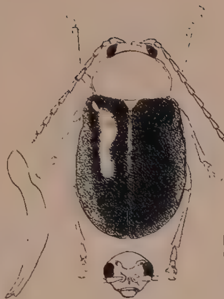
Explanation of Plate 2

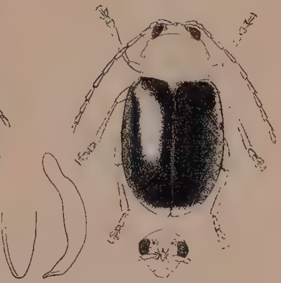
Fig. 10. *Homoschema hoffmani* n. sp. Fig. 11. *Homoschema buscki* n. sp. Fig. 12. *Homoschema leucurum* n. sp. Fig. 13. *Homoschema pingue* n. sp. Fig. 14. *Homoschema opimum* n. sp. Fig. 15. *Homoschema latitarsum* n. sp. Fig. 16. *Homoschema latum* n. sp. Fig. 17. *Homoschema obesum* n. sp.



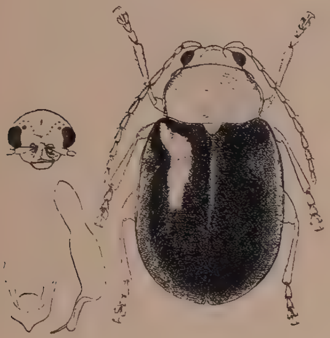
10. H. hoffmani



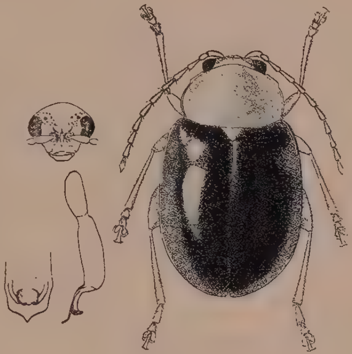
11. H. ouscki



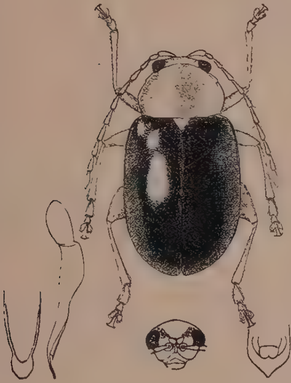
12. H. leucurum



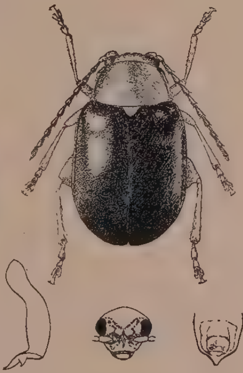
13. H. pingue



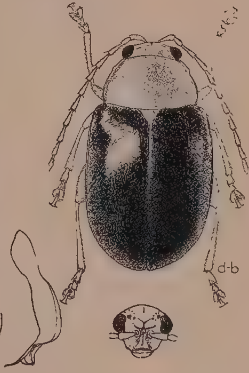
14. H. opimum



15. H. latitarsum



16. H. latum



17. H. obesum

BLAKE—FLEA BEETLES

but not so closely to them as they are to each other. From the one specimen seen, it would seem to be slightly smaller and has a differently shaped apex on the aedeagus.

Homoschema obesum n. sp.

Fig. 17

From 3.2–4 mm. in length, 2–2.8 mm. in width, convex, elytra very faintly and finely punctate, reddish or yellowish with violaceous elytra. Head with an interantennal area broadly convex and extending down the lower front, depressed below the antennal sockets.

Type.—Male, and 8 paratypes, U. S. N. M. Cat. No. 59200: 1 paratype in Museum of Comparative Zoology, Type No. 28239.

Type locality.—El Vigia, Ponce, Puerto Rico, collected on a vine by R. G. Oakley, July 26, 1934.

Other localities. — Yauco, March 28, 1929, Mayaguez, Feb. 24, 1925, Algarrobo, Feb. 27, 1931, Boqueron, April 18, 1924, all from Puerto Rico, in the Stuart T. Danforth collection.

Remarks.—This is one of the largest species of the genus and very closely related to the two following from St. Croix and Haiti. It has a short broad aedeagus very similar to that of *H. latum* but with a more sinuate apex.

Homoschema pingue n. sp.

Fig. 13

From 3.2–4 mm. in length, 2–2.8 mm. in width, convex, very faintly and finely punctate, reddish or yellowish with violaceous elytra; head with a broad median convex area from between antennal sockets extending down lower front with a depression below antennal sockets.

Type.—Male, and 1 paratype Museum of Comparative Zoology Type No. 28240; 1 paratype in U. S. N. M. Cat. No. 59201.

Type locality.—St. Croix, V. I., H. A. Beatty collector, also collected there by H. Morrison June 14, 1917.

Remarks.—This is very closely related to *H. obesum* from

Puerto Rico, showing only a slight difference in the tip of the aedeagus.

Homoschema opimum n. sp.

Fig. 14

From 3.3–4 mm. in length, 2.1–2.4 mm. in width, convex, very faintly and finely punctate, reddish or yellowish with violaceous sometimes even deep bronzy purple elytra; head with a broad median interantennal convexity extending down front and a depression on either side below antennal sockets.

Type.—Male, and 2 paratypes, Museum of Comparative Zoology Type No. 28241.

Type locality.—San Jose de las Matas, Dominican Republic, 1000–2000 ft. alt., collected in June, 1938, by P. J. Darlington.

Other localities.—Macoris, March 30, 1913, P. G. Russell; S. Francisco Mts., April 9, 1905, August Busck; Duarte, Domingo City, July 21, 1917, H. Morrison, all Dominican Republic. Poste Terre Rouge, Oct. 5, 1934, P. J. Darlington; Cape Haitien, W. M. Mann; Port au Prince, April, 1925, G. N. Wolcott; La Vanneau, June 20, and Bizoton, Nov. 25, on *Stigmatophyllum lingulatum*, both by W. A. Hoffman, all Haiti.

Remarks.—This is the fourth of the group and closely related to the Puerto Rico and St. Croix species with only a little difference in the aedeagus. The frontal convexity on the head seems a little narrower and less convex.

Homoschema orientense n. sp.

Fig. 9

From 2.4–2.9 mm. in length, 1.4–1.7 mm. in width, convex, distinctly punctate, reddish yellow with violaceous elytra. Head with a broad interantennal elevation extending down the short lower front.

Type.—Male, and 8 paratypes, U. S. N. M. Cat. No. 59202; 1 paratype in Museum of Comparative Zoology, Type No. 28245.

Type locality.—Guantanamo, Cuba, collected in 1918 by W. M. Mann.

Remarks.—The only way of distinguishing this from the following species is by comparing the aedeagi. In this species the aedeagus is narrowed towards the apex, instead of being broader near the apex than behind it. The distinct punctation of the elytra distinguishes this from *H. latum.*

Homoschema manni n. sp.

Fig. 8

From 2.5–3 mm. in length, 1.5–1.7 mm. in width, convex, with distinctly punctate elytra, reddish yellow with violaceous elytra. Head with a moderately broad interantennal area extending down the front and slightly elevated.

Type.—Male, and 2 paratypes, U. S. N. M. Cat. No. 59203, 1 paratype in Museum of Comparative Zoology, Type No. 28244.

Type locality.—Felton (Oriente Province on Antilla Bay), Cuba, collected by W. M. Mann.

Other localities. — Cayamas, Cuba, E. A. Schwarz, Bah. Honda, Cuba, in June by H. F. Wickham.

Remarks.—Like the preceding species this is distinctly punctate. The shape of the aedeagus separates it from its close relative, *H. orientense.*

Homoschema darlingtoni n. sp.

Fig. 7

From 2.4–2.8 mm. in length, 1.3–1.5 mm. in width, moderately convex, without distinct punctures, reddish yellow with violaceous elytra. Head with a rather broad interantennal area elevated between antennal sockets and extending down the short lower front.

Type. —Male, and 1 paratype, Museum of Comparative Zoology, Type No. 28246; 1 paratype in U. S. N. M. Cat. No. 59204.

Type locality.—Coast below Pico Turquino, collected June 26–30, 1936, by P. J. Darlington.

Remarks.—This species although closely related to *H. orientense* and *H. manni,* differs in not having visibly punctate elytra. It has a shorter frontal elevation on the head. The aedeagus is not so broad as in *manni* and broader than in *orientense* with a strongly recurved orificial plate.

Homoschema androsense n. sp.

Fig. 6

From 2.5–3 mm. in length, 1.5–1.8 mm. in width, convex, distinctly punctate, reddish yellow with violaceous elytra. Head with a short, broad, elevated interantennal area that extends down the lower front.

Type.—Male, and 1 paratype, Museum of Comparative Zoology Type No. 28247.

Type locality. — Andros Island, Bahamas, collected Aug. 1–10, 1904, by "Barber" (? Barbour).

Remarks.—The distinctly punctate and convex elytra and the broadly rounded apex on the aedeagus place this species very near *H. manni.* The area between the antennal sockets of the head is short and broad as in *H. darlingtoni.*

THE SALAGUBONG GONG, A FILIPINO INSECT TOY

By Charles T. Brues
Harvard University

While staying in the hills above Dumaguete on the island of Negros in the Philippines we had the opportunity to see in operation a very interesting and ingenious mechanical toy made and operated by the native children.

The motive power is furnished by a good-sized melolonthid beetle somewhat larger, but quite similar to our North American species of *Phyllophaga*, and still more like the common European dor beetle, *Melolontha vulgaris*. The specimens used by the children belong to two species. Most of them were *Leucopholis pulverulentus* Burm. and one belongs to another somewhat closely related species, *Lepidiota punctum* Blanch. Doubtless any other similar, lubberly lamellicorn would serve equally well. Beetles of this type are abundant in the region, and in general, together with other large phyllophagous lamellicorns are known by the Visayan name, Salagubong. The "gong," as operated by the beetle is one of the five-gallon kerosene or gasoline tins which consistently carry the flavor of civilization everywhere into the furthest reaches of the tropics. We have seen these tins used for a multiplicity of purposes, and may now add still another which seems never to have been called to the attention of entomologists.

Aside from the beetle and the can, two plant materials are used in the construction of the gong: four thin sticks of bamboo, each about two feet in length, and three strands of tenacious fibre taken from the leaf-sheaths of the abaca plant, *Musa textilis*, which is grown extensively in the region for the commercial production of Manila hemp.

As shown in the accompanying illustration, two of the bamboo sticks are implanted in the ground and connected near their tops by a strand of fibre securely tied at each end, forming a miniature pair of football goal posts. The third stick is similarly fixed in the ground to form the apex of a triangle. One end of the fourth bamboo stick is now fastened to the transverse abaca fibre by a tight abaca loop, and suspended near its other end to the third stick by a fibre which allows it to move freely back and forth next to the vertical stick. The tin is placed near this vertical stick where it will be tapped by the horizontal stick as the latter swings on its longitudinal axis. Finally, the beetle is tied toward one side of the horizontal fibre by still another fibre which is short enough to keep the beetle off the ground. The base of the hind femora next to the coxae form a secure point to tie the beetle at the end of its abaca tether.

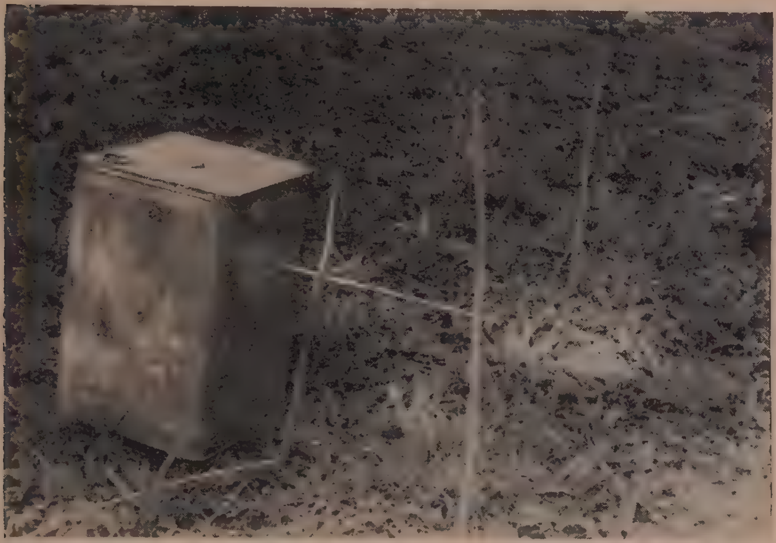


Fig. 1. The salagubong gong. The oil can which acts as a resonator is shown at the left. The first pair of bamboo sticks mentioned in the text are at the right, connected by the thread from which the beetle is suspended.

After a little teasing and manipulation, the beetle gets into action and attempts to fly away. As the abaca fibre grows taut, the path of motion assumes a circular orbit and the transverse fibre sways violently back and forth as the beetle circles unwillingly on its flying trapeze. The tin may now be shifted till it receives a staccato tap from the end of the stick at each revolution of the beetle. These taps strike the gong at the rate of two or three per second, dependent upon the muscular tonus of the salagubong. Such taps are surprisingly loud and sufficiently strong to attract attention within a radius of 100 feet or more.

Each performance lasts half a minute or longer, till the beetle gives up the attempt to escape. After a short period of inactivity, further prodding readily induces an encore performance of similar duration.

THE EUROPEAN MANTIS (*Mantis religiosa* L.) IN NEW ENGLAND. —In view of the recent reports from Ontario (James, H. G., 1948, 79th Annu. Rept. Ent. Soc. Ont., 41-44) it seems pertinent to list the following New England records of this introduced insect: one ♀, Burlington, Vt., July 27, 1949; one ♀, Chester, Vt., Sept. 7, 1948 (Dr. C. T. Parsons); several specimens on summit of Mt. Mansfield, Vt., Aug., 1949 (Dr. E. A. Chapin); several at Cummington, Mass., Oct., 1949; one egg mass also at Cummington, Nov., 1949 (Dr. A. B. Gurney); one ♀, Melrose, Mass., Sept., 1949 (Dr. B. R. Lutz); one ♀, Watertown, Mass., Aug., 1949 (Mr. H. L. Starrett); one specimen, possibly from Conn., in Agr. Exp. Sta. Collection, no data. A number of specimens were also brought in from the Boston area during the 1949 season.

Dr. K. D. Roeder of Tufts College released specimens in Medford and Concord, Mass., in 1945, which seem to have been responsible for specimens taken in the same localities the following year. It remains for future winters to determine just how permanent this apparently wide establishment may be.—WILLIAM L. NUTTING, Biological Laboratories, Harvard University.

ON THE STATUS OF *LEPTOTHORAX* MAYR AND SOME OF ITS SUBGENERA

By Marion R. Smith

Bureau of Entomology and Plant Quarantine, Agricultural
Research Administration, United States Department
of Agriculture

The genus *Leptothorax* was established by Mayr in 1855 (Verh. Zool.-Bot. Gesell. Wien 5: 431) for a number of Palearctic ants, such as *clypeatus* (Mayr), *acervorum* (F.), *muscorum* (Nyl.), *tuberum* (F.), and *unifasciatus* (Latr.), without genotype designation. This was not done until 1903, when Bingham (Fauna of British India (Hymenoptera), vol. 2, p. 214) selected *acervorum* as the genotype. Ruzsky, in 1904 (Zapiski Imp. Russk. Geogr. Obshch. 41 (1): 288), described a new genus, *Mychothorax*, and chose the same form, *acervorum*, as a genotype, thus making *Mychothorax* an isogenotypic synonym of *Leptothorax*. W. M. Wheeler, in 1911 (Ann. N. Y. Acad. Sci. 21: 166), overlooking Bingham's previous designation of *acervorum* as genotype of *Leptothorax*, named *acervorum* a second time as type of this genus. Then in 1922, Emery (*in* Wytsman's, Genera Insectorum, fascicule 174 c: 248), apparently unaware of the previous designation, selected *clypeatus* as genotype for *Leptothorax*, presumably because it was the first species listed by Mayr in his original article; and this concept has been universally adopted. However, since Bingham's is the first valid genotype designation for *Leptothorax*, the genus must be based on *acervorum*.

It thus becomes necessary to propose a new subgenus for Emery's concept of *Leptothorax*, subg. *Leptothorax*. This group, which is both Holarctic and Neotropical in distribution, and contains a large number of North American ants, I propose to name *Myrafant*, for my wife, whose maiden name was Myra Fant.

Leptothorax, subg. Myrafant, new subgenus

Type: *Leptothorax curvispinosus* Mayr. By present designation.

This subgenus includes such common North American forms as *fortinodis* Mayr, *rugatulus* Emery, *longispinosus* Roger, *texanus* W. M. Wheeler, *tricarinatus* Emery and many others. For a list of forms see Emery, 1922 (in Wytsman's, Genera Insectorum, fascicule 174 c: 251-259).

The worker has 11- or 12-segmented antennae; thoracic humeri usually rounded, occasionally subangular; mesoepinotal impression on the dorsal surface of the thorax usually absent, if present, scarcely perceptible.

In the preparation of a catalogue of Nearctic ants, it was noted that *Goniothorax* Emery, 1896, is preoccupied by *Goniothorax* Milne-Edwards, 1879. As *Nesomyrmex* W. M. Wheeler is the next available name, it supplants *Goniothorax* Emery. The synonymy is as follows:

Leptothorax subg. *Nesomyrmex* W. M. Wheeler

Leptothorax, subgenus *Goniothorax* Emery, 1896, Bol. Soc. Ent. Ital. 28:26, 58. Preoccupied. Type: *Leptothorax vicinus* Mayr. Designated by W. M. Wheeler, 1911.

Nesomyrmex W. M. Wheeler, 1910, Bul. Amer. Mus. Nat. Hist. 28:259. Type: *Nesomyrmex clavipilis* W. M. Wheeler. Monobasic.

Caulomyrma Forel, 1914, Bul. Soc. Vaud. des Sci. Nat. 50: 233. Type: *Leptothorax echinatinodis* Forel. Original designation.

Most of the ants of this subgenus occur in the Ethiopian, Oriental and Neotropical Regions. Our only known North American species is *wilda* M. R. Smith, from extreme southern Texas.

BOOK REVIEW

The Ants of North America, by William S. Creighton. Bulletin of the Museum of Comparative Zoology at Harvard College, vol. 104, pp. 1-585, 57 plates (April, 1950).

For the first time in this century, there is available in one volume a comprehensive treatment of all the genera and species of North American (Nearctic) ants. Interest of entomologists in this work will be aroused chiefly by the complete keys and plates, which allow more accurate determination of our ants than has ever before been possible. The major significance of this volume does not rest with this quality, however.

Professor Creighton's long-awaited work easily ranks with the two most fundamental and influential previous works in formicid taxonomy, Mayr's "Formicina Austriaca" and Emery's contributions to the "Genera Insectorum." Mayr was the first to recognize and apply generic differences among ants on a logical and systematic basis. Emery digested the vast amount of world literature and produced a comprehensive classification, generic key and catalog for the family. Creighton, in a single stroke that cannot be ignored, has applied the modern concepts of population systematics to the entire North American fauna.

In its purpose and effect, Dr. Creighton's work is a detailed generic and specific *revision* of the Nearctic ants. It is bold, sweeping and relentless. The author lucidly exposes the confusion that has attended the growth of the taxonomy of our fauna. Familiar but worthless names of some of our commonest forms fall into synonymy by the score. The taxonomic categories are restricted to the species and subspecies (geographical race) below the subgenus, and the concept of variety is rejected as useless and meaningless. The evidence presented for this system is so overwhelming and detailed, in the opinion of this reviewer, that *any* myrmecologist clinging to the pentanomial or hexanomial systems will find logical refutation impossible. Although systematics based on population concepts has presumably not been completely unknown to myrmecologists, the literature of the past ten years abundantly proves that the major principles set forth by Ernst Mayr and others have rarely been applied correctly in specific cases among the ants. Most myrmecographers seem to have understood rather vaguely that varieties should not be described, but that subspecies were allowable; the essentially geographical nature of the subspecies is not evident at all in the majority of forms placed in that category up to the present.

In the matter of individual case treatments in Creighton's work, it is necessarily true that many of the subspecies are little more than intelligent guesses based on abundant, but still insufficient material. During the many months the book remained in the hands of the editor, proofreaders and printers, some of the names carried in it have been synonymized, and several new forms have been described in the mounting North American literature. One could scarcely expect a work of this scope to be in any sense a final treatment of the group. Few entomologists, even including some myrmecologists, realize the extreme confusion that has reigned in the taxonomy of our ant fauna; the most experienced entomologists have been unable to name with any confidence many of our commonest species. For this reason, it must be made as emphatic as possible that "The Ants of North America" is *not* an infallible guide based upon a triumphant century of myrmecographic endeavor; rather, it is the exposure of the fundamental taxonomy that may make such a century possible.—William L. Brown, Jr., Biological Laboratories, Harvard University.

CAMBRIDGE ENTOMOLOGICAL CLUB

A regular meeting of the Club is held on the second Tuesday of each month (July, August and September, excepted) at 8:00 p.m. in Room B-455, Biological Laboratories, Divinity Ave., Cambridge. Entomologists visiting Boston are cordially invited to attend.

FOR SALE

THE ANTS OF NORTH AMERICA, by Professor Wm. S. Creighton. Published in April, 1950, as volume 104 of the Bulletin of the Museum of Comparative Zoology, with 585 pages and 57 plates. Price $10.00 (postpaid). Send orders to Museum of Comparative Zoology, Harvard College, Cambridge, Mass.

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